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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/929,765	08/14/2001	Chih Chin Liao	56370	9374

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EXAMINER

WARREN, MATTHEW E

ART UNIT PAPER NUMBER

2815

DATE MAILED: 10/21/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/929,765

Applicant(s)

LIAO

Examiner

Matthew E. Warren

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 August 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 6-8 and 11-13 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 6-8 and 11-13 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

This Office Action is in response to the Arguments filed on August 6, 2003.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 6-8 and 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over the Applicant's Prior Art Figures 3 and 4 (APAF) in view of Abrams (US 3,560,256).

The APAF 3 and 4 shows a BGA package a substrate 10 having a front and back side, a chip 20 mounted on the front side of the substrate, the chip having an array of bond pads 30B, an array of solder balls 40A on the back side of the substrate, and an array of bond fingers 60B beside the chip and electrically connected to the bond pads of that chip. An array of electrically conductive vias (72 & 74) penetrate from the front to the back side of the substrate and connect to the solder balls. The package also comprises a plurality of continuous electrically-conductive traces (70A-70D) for connecting a first subgroup of the bond fingers to corresponding ones of the vias. The continuous traces including at least one trace interposed between a second subgroup of the bond fingers and their corresponding vias. The APAF shows all of the elements of the claims except the electrically conductive bridge. Abrams shows (fig. 1) a circuit in which crossover or conductive bridges are used to increase the packing density of the

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circuit (col. 2, lines 14-26). The electrically conductive bridge 26 spans in an overhead manner across interposing traces (22c & 22d) and connect one end of a trace 22b to the end of another trace 22a. There is a gap between the bridge and the interposing trace (that gap is filled with an insulating material). The bridge/crossover is made of gold wires or includes a resistor (col. 4, lines 3-6, & 25-31) and is free of interference with the electrically conductive trace due to the insulating material (27) between the bridge and traces. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the APAF by employing conductive bridge structures that cross over circuit traces as taught by Abrams to increase the packing density of the circuit.

Response to Arguments

Applicant's arguments filed with respect to claims 6-8 and 11-13 have been fully considered but they are not persuasive. The applicant primarily argues that the cited references do not show all of the elements of the claims, primarily the limitations that there is a gap between the electrically conductive bridge and the interposing trace. The applicant further defines the term "gap" to mean a separation in space. The examiner believes that the cited art shows all of the elements of the claims including the limitation of a gap. The APAF, showing the interposing traces, vias, and bond fingers, was only deficient in showing the electrically conductive bridge. Abrams was cited to cure the deficiencies of the APAF by disclosing an electrically conductive bridge that is a gold wire or resistor (col. 4, lines 3-6, & 25-31). The bridge of Abrams has a gap between it

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and the underlying interposing trace, it just happens that the gap is filled with a dielectric material. If the term "gap" means "a separation in space" then Abram's bridge still discloses the gap. There is a separation in space between the bonding wire and the electrically conductive trace of Abrams. It happens that the gap is filled with dielectric. The examiner has broadly interpreted the added limitation to mean that the gap includes a space between bridge and trace but does not necessarily mean that the space includes air. With this interpretation, it can be understood the bridge and trace of Abrams is spaced apart by a dielectric. The applicant further admits that the gap of the instant invention will eventually be filled with resin during an encapsulation process to prevent voids and a popcorn effect. So in the final product of the applicant's invention, the gap is filled with a dielectric material anyway. The Abrams gap is already filled with dielectric material so there would be no voids or popcorn effect once the device is encapsulated. With such a configuration, Abrams assures that there is no voids between the bridge and trace during encapsulation because those spaces are already filled. Therefore the combined references show all of the elements of the claims and this action is made final.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within

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TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew E. Warren whose telephone number is (703) 305-0760. The examiner can normally be reached on Mon-Thurs, and alternating Fri, 9:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (703) 308-2772. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

MEW

MEW
October 17, 2003



ALLAN R. WILSON
PRIMARY EXAMINER